

WHAT IS CLAIMED IS:

1. An enzyme-treated papermaking sludge consisting essentially of a papermaking sludge combined with an enzyme composition.

2. The enzyme-treated papermaking sludge of claim 1, wherein said enzyme
5 composition has cellulytic activity.

3. The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition has both cellulytic and hemicellulytic activity.

4. The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition has lipase activity.

10 5. The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition is added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight active enzyme based on the dried solids weight of both the active enzyme and the sludge.

15 6. The enzyme-treated papermaking sludge of claim 5, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

7. An enzyme-treated papermaking sludge composition comprising from about 50% to about 100% by weight papermaking sludge, and from about 1% by weight to about 50% by weight enzyme composition, based on the dried solids weight of the papermaking
20 sludge and the enzyme composition.

8. The enzyme-treated papermaking sludge of claim 7, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

9. A method of making paper or paperboard comprising:

a) combining at least one enzyme composition and at least one papermaking sludge to form an enzyme-treated sludge;

b) combining the enzyme-treated sludge with a papermaking pulp to form a treated pulp; and

5 c) forming the treated pulp into a paper or paperboard product.

10. The method of claim 9, further comprising introducing at least one sizing material to the papermaking pulp.

11. The method of claim 10, wherein said sizing material comprises an ASA sizing emulsion.

10 12. The method of claim 9, wherein said enzyme composition contains from about 5 % to about 20 % by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

13. The method of claim 9, wherein said enzyme composition is added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight
15 active enzyme based on the dried solids weight of both the active enzyme and the sludge.

14. The method of claim 9, wherein said enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

15. The method of claim 9, wherein said enzyme composition comprises a lipase enzyme.

20 16. The method of claim 9, wherein said enzyme-treated sludge is added in an amount of from about 1 pound per ton of papermaking pulp to about 50 pounds per ton of papermaking pulp based on the dried solids weight of both the enzyme-treated sludge and the papermaking pulp.

17. A paper or paperboard product made from the method of claim 9.

18. A method of improving sizing in a paper or paperboard product, comprising:
combining a papermaking sludge with an enzyme composition to form an enzyme-treated sludge;

combining said enzyme-treated sludge with a papermaking pulp to form a treated pulp;

5 and

forming a paper or paperboard product from said treated pulp, wherein said product has improved sizing compared to the sizing of an identical paper or paperboard product but not having the sludge treated with enzyme composition.

19. The method of claim 18, wherein said papermaking pulp comprises a sizing
10 material.

20. The method of claim 18, wherein said papermaking pulp comprises an ASA sizing emulsion.

21. The method of claim 18, wherein said improved sizing comprises an improved retention of sizing material.

22. The method of claim 18, wherein said improved sizing comprises an improved
15 resistance to size reversion.

23. The method of claim 18, wherein said enzyme composition has cellulytic activity.

24. The method of claim 18, wherein said enzyme composition has both cellulytic
20 and hemicellulytic activity.

25. The method of claim 18, wherein said enzyme composition has lipase activity.

26. The method of claim 18, wherein said enzyme composition is added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight active enzyme based on the dried solids weight of both the active enzyme and the sludge.

27. The method of claim 26, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

28. A paper or paperboard product made from a treated papermaking pulp, said
5 treated papermaking pulp comprising a papermaking pulp and an enzyme-treated papermaking sludge.

29. The paper or paperboard product of claim 28, wherein said enzyme-treated
papermaking sludge is present in said paper or paperboard product in an amount of from about
5 pounds per ton of papermaking pulp to about 200 pounds per ton of papermaking pulp based
10 on the dried solids weight of both the enzyme-treated sludge and the papermaking pulp.